

CLAIMS

What is claimed is:

1. A method of calibrating an electrophotographic machine having an image-bearing surface, said method comprising the steps of:

estimating a reflectivity of the image-bearing surface based upon an amount of usage of the electrophotographic machine; and

5 adjusting at least one electrophotographic condition, said adjusting being dependent upon said estimating step.

2. The method of claim 1, wherein said amount of usage comprises at least one of a number of revolutions of the image-bearing surface, a number of pages output by the electrophotographic machine, a number of times that toner has been added to the electrophotographic machine, an amount of toner usage, and a number of pixels produced by the electrophotographic machine.

3. The method of claim 1, comprising the further step of determining a reflectivity of at least one color toner on the image-bearing surface, said adjusting step being dependent upon said determining step.

4. The method of claim 3, wherein the electrophotographic machine comprises a multi-color electrophotographic machine, said determining step including:

depositing a plurality of toner patches of each of a plurality of colors on the image-bearing surface;

emitting light onto said toner patches;

measuring an amount of light that is reflected off of each of said toner patches;

emitting light onto a bare section of the image-bearing surface, the bare section having substantially no toner thereon; and

10 measuring an amount of light that is reflected off of the bare section. said adjusting being dependent upon at least one of said measuring steps.

5. The method of claim 4, wherein said adjusting step is dependent upon each of said measuring steps.

6. The method of claim 4, wherein the plurality of colors include cyan, magenta and yellow.

7. The method of claim 4, wherein each of said emitting and measuring steps are performed with a toner patch sensor.

8. The method of claim 4, wherein said adjusting step is performed independently for each of the colors of the multi-color electrophotographic machine.

9. The method of claim 8, wherein said adjusting step is performed by calculating a saturation reflection ratio for each of the colors of the multi-color electrophotographic machine.

10. The method of claim 4, wherein said toner patches comprise solid area toner patches.

11. The method of claim 4, wherein said plurality of toner patches are formed under various electrophotographic conditions.

12. The method of claim 4, wherein said adjusting step includes the substeps of:

calculating a respective reflection ratio for each of said toner patches dependent upon each of said measuring steps; and

5 converting each of said reflection ratios into a respective predicted lightness value.

13. The method of claim 12, wherein each said reflection ratio comprises a ratio between the amount of light that is reflected off of a respective said toner patch and the amount of light that is reflected off of the bare section.

14. The method of claim 12, comprising the further steps of:
fitting said predicted lightness values to an exponential function; and
using said exponential function to ascertain at least one of a desired laser power and a desired developer bias needed to achieve a desired lightness value.

15. The method of claim 12, comprising a further step of converting yellow reflection ratios into C.I.E. b^* values.

16. The method of claim 12, wherein each of said predicted lightness values comprises a lightness value expected if a corresponding said toner patch were to be transferred to paper and fused.

17. The method of claim 1, wherein the image-bearing surface comprises an intermediate transfer medium.

18. The method of claim 17, wherein the intermediate transfer medium comprises an intermediate transfer belt.

19. The method of claim 1, wherein said at least one electrophotographic condition comprises at least one of a laser power, a developer bias, a gamma correction and a halftone linearization.

20. A method of calibrating an electrophotographic machine having an image-bearing surface, said method comprising the steps of:

- 5 creating a plurality of toner patches on the image-bearing surface, each said toner patch being created with at least one of a different test laser power value and a different test developer bias value;
- emitting light onto said toner patches;
- measuring an amount of light that is reflected off of each of said toner patches;
- emitting light onto a bare section of the image-bearing surface, the bare section having substantially no toner thereon;
- 10 measuring an amount of light that is reflected off of the bare section;
- estimating a reflectivity of the image-bearing surface based upon an amount of usage of the electrophotographic machine; and
- determining at least one of a desired laser power value and a desired developer bias value, said determining being dependent upon said estimating step and each of
- 15 said measuring steps.

21. The method of claim 20, wherein said determining step includes the substeps of:

- calculating a respective reflection ratio for each of said toner patches dependent upon each of said measuring steps;
- 5 converting each of said reflection ratios into a predicted lightness value; and
- ascertaining at least one of a desired laser power and a desired developer bias needed to achieve a desired lightness value, said ascertaining being dependent upon said predicted lightness values and at least one of said test laser power values and said test developer bias values.

22. The method of claim 21, wherein said ascertaining step includes:

- fitting said predicted lightness values and at least one of said test laser power values and said test developer bias values to an exponential function; and
- 5 using said exponential function to calculate said at least one of a desired laser power and a desired developer bias needed to achieve said desired lightness value.

23. The method of claim 21, wherein said reflection ratios comprise ratios between the amounts of light that are reflected off of said toner patches and the amount of light that is reflected off of the bare section.

24. The method of claim 21, wherein each of said predicted lightness values comprises a lightness value expected if a corresponding said toner patch were to be transferred to paper and fused.

25. A method of calibrating a multi-color electrophotographic machine having an image-bearing surface, said method comprising the steps of:

forming a plurality of cyan solid area toner patches on the image-bearing surface, each said cyan toner patch being formed under a respective one of a plurality of electrophotographic conditions;

forming a plurality of magenta solid area toner patches on the image-bearing surface, each said magenta toner patch being formed under a respective one of said plurality of electrophotographic conditions;

forming a plurality of yellow solid area toner patches on the image-bearing surface, each said yellow toner patch being formed under a respective one of said plurality of electrophotographic conditions;

emitting light onto each of said toner patches;

measuring an amount of light that is reflected off of each of said toner patches;

emitting light onto a bare section of the image-bearing surface, the bare section having substantially no toner thereon;

measuring an amount of light that is reflected off of the bare section;

estimating a reflectivity of the image-bearing surface based upon an amount of usage of the electrophotographic machine; and

adjusting at least one of a laser power and a developer bias dependent upon said estimating step and each of said measuring steps.

26. The method of claim 25, wherein said plurality of electrophotographic conditions comprise at least one of a plurality of laser power values and a plurality of developer bias values.